occupying exactly two minutes, while it left a shining track for several seconds in the sky. On August 12 at about 9 p.m. a meteor was seen at Sarpsborg, in Norway. It represented a fireball with a long shining tail, passing in a straight line across the sky in an easterly direction. It was in view for about one minute.

A SHOCK of earthquake of a rather severe nature, but of short duration, was felt at Agram at 3.40 p.m. on the 28th inst. It was accompanied by subterranean rumblings.

M. JACQUELAIN has endeavoured to prepare a pure carbon for electric purposes that should be as hard and as conductive as gas carbon. He first takes gas carbon, which he submits to four processes: (1) treatment with dry chlorine at a red heat for thirty hours; (2) treatment with hot alkali for about three hours; (3) immersion in hydrofluoric acid (1 to 2 of water) at a temperature of 15° to 25°; (4) carbonised by heating strongly in the vapour of a high-boiling hydrocarbon, for commercial purposes gas tar will do well. All these operations may be performed after the carbon has been cut into sticks. By these processes the impurities have been reduced to a minimum and a good, pure carbon obtained.

THE director of the Jardin d'Acclimatation of Paris has just received an entire tribe of Kalmucks from the desert lands in the neighbourhood of the Caspian Sea. It consists of 9 men, 8 women, 4 girls and children, 18 camels, 15 mares and young horses, 10 Kirghiz sheep, with tents, instruments, arms, &c. They will probably visit London after having made in Paris a stay proportionate to their success.

ON Sunday week an extraordinary ascent was made at Nogent-sur-Marne. The aëronaut ascended at 4.30 p.m., and landed near St. Cloud on the following day at 7 a.m. He remained 14½ hours in the air, and travelled no more than 30 kilometres.

M. FRIEDEL has found that at certain temperatures blende, chloride of sodium, and boracite exhibit pyroelectric phenomena. Boracite he found to be so most markedly at the point when it lost its cubical form whilst cooling after being heated to 265°.

MESSRS. LONGMANS AND CO. have issued the eleventh edition of Prof. Atkinson's translation of Ganot's "Elementary Treatise on Physics." About thirty-two pages have been added to the new edition, while the chapter on the steam-engine has been entirely recast.

MR. FISHER UNWIN has added to his useful series of Half-Holiday Handbooks a Guide to Wimbledon, Putney, and Barnes. The same publisher also sends us a little Handbook to the Fernery and Aquarium.

M. DE FONVIELLE asks us to say that by mistake he stated in his note on the Montgolfier statue that it was cast in bronze; it is in plaster, and the cast is being executed.

THE additions to the Zoological Society's Gardens during the past week include a Maholi Galago (*Galago maholi*), purchased; a Vervet Monkey (*Cercopithecus lalandii*), presented by Mr. J. H. Sheppard; two Golden Eagles (*Aquila chrysaëtos*) from Scotland, presented by Mr. A. H. Browne; two Short-toed Eagles (*Circaëtus gallicus*), purchased; a Yellow-headed Conure (*Conurus jendaya*), presented by Her Grace the Duchess of Wellington; a Slender-billed Cockatoo (*Licmetis tenuirostris*), presented by Mr. R. Keele; a Land Rail (*Crex pratensis*), presented by Mr. M. Bryant; a Partridge Bronze-winged Pigeon (*Geophaps scripta*), and a Modest Grass Finch (*Amadina modesta*), presented by Mrs. J. Abrahams; a Martinique Waterhen (*Porphyrio martinicus*), a Mississippi Alligator (*Alligator mississippiensis*), presented by Mr. Cuthbert Johnson; six Chameleons (*Chamæleon vulgaris*), purchased; a Hog-nosed Snake (*Heterodon platyrhinos*), presented by Mr. F. J. Thompson.

OUR ASTRONOMICAL COLUMN

THE DIVISION OF BIELA'S COMET.—Those who have made themselves acquainted with Hubbard's masterly researches on the motion of Biela's comet will be aware that he arrived at the conclusion that the disruption of the comet, by whatever cause effected, took place in heliocentric longitude 318·6°, and latitude + 12·0°, distance 4·36, which position he states the comet occupied in November, 1844. In fact, if we adopt Hubbard's final elements for perihelion passage in February, 1846, we find for 1844, November 16·0 G.M.T., longitude 318° 36′, latitude + 12° 2′, radius-vector 4·3665, and the true anomaly 209° 57′. At the time when Hubbard's investigation was made, no one of the known minor planets attained this distance from the sun. We are now acquainted with several which recede further, towards aphelion passage, and an encounter between the comet and a small planet might explain the phenomenon which occasioned so much astonishment in 1845-46. The orbits of some 230 of these bodies have been calculated, but on submitting them to examination with a view to discover whether any one of the planets could pass through the point indicated by Hubbard as that of the separation of Biela's comet, we arrive at a negative result. *Andromache* recedes to a distance of 4·723 from the sun, *Ismene* to 4·590, and *Hilda* to 4·632, but at such distances all three are much nearer to the plane of the ecliptic than Hubbard's position. We may therefore say that if the Biela catastrophe was occasioned by collision with a small planet, it was not one of the large number already calculated.

VARIABLE STARS.—Mr. Knott has succeeded this year in following the variable S Virginis almost if not quite to a minimum, but unfortunately the long twilight, moonlight, and hazy and cloudy skies in July preventing him from fixing the exact date. On April 4 the star was 9·7m., and ruddy; April 25, 10·15; May 4, gauged 11·5; May 31, 12·1; June 25 and 28, 12·2 and 12·3; June 30, 12·7; and on July 4, by a doubtful observation, 12·75. The observations made by Mr. Hind, soon after the discovery of the star's variability in 1852, compared with those of Prof. Schönfeld to 1875, give the following elements;—

		Days.
Minimum	1875, April	27·4 + 373·77 E.
Maximum	1866, June	7·15 ,,

This formula assigns July 4, 1883, for minimum, a date closely borne out by Mr. Knott's observations, and for next maximum, 1883, October 30, not observable.

The star varies from about 5·7m. to 12·7. It is XIII. 420 of Weisse's Bessel, and its position for 1884·0 is in R.A. 13h. 26m. 56·9s., N.P.D. 96° 35′ 46″.

Mr. Knott has also found a maximum of R Scorpii on 1883, July 9, magnitude 10·1. S Scorpii had already passed maximum when the observations commenced in the middle of May.

THE GREAT COMET OF 1882.—It may be hoped that one or more of the larger instruments in our observatories will be employed in a further attempt to fix positions of this remarkable body during the absence of moonlight in September. Positions were given in NATURE, vol. xxviii. p. 334, and will also be found in the *Astronomische Nachrichten*.

Now that the period of revolution resulting from the most reliable calculations approximates to eight centuries, it would be interesting to bring together in their original form the numerous descriptions of the great comet of 1106, the substance of which is given by Pingré, more especially the references to the direction of the tail (between the east and north) in the latter part of the comet's appearance. Like the comet of 1882 it was seen close to the sun: one historian says it was so observed from the third to the ninth hour of the day on February 4.

GEOGRAPHICAL NOTES

WITH reference to the Austrian Meteorological Expedition which on Tuesday last arrived in Vienna from Jan Mayen, we are now able to give the following particulars of the wintering at the island. Leaving Iceland on August 1 the *Pola* sighted the southern point of Jan Mayen on the 3rd, but a thick fog prevented landing until the following day. Lieut. von Wolgemuth, with some officers, at once came on board, and great were the rejoicings on both sides at the meeting. The chief of the expedition states that at the end of August, 1882, the northern storms began with a heavy fall of snow. September was, however, fine and warm, but with October the storms from the north again came back with cold weather, accompanied by magnificent auroræ of yellow, blue, and sometimes even red colour. The aurora borealis was always seen, and in constant motion, at times covering the whole firmament. On November 12 the Polar night commenced, but the darkness was not appalling, as the ever-recurring auroræ lit up the night. Terrible snowstorms often compelled the members to keep indoors, and not until December came the ice began to form along the coast, but it was often after broken up under terrific storms. During these the spray from the surf on the coast was often thrown several hundred feet inland and covered every object with salt crystals, so that fresh water had to be fetched long distances. In January the greatest cold occurred, −35° C., but even during that month southerly winds often brought the glass up to +20° C. On January 30 the Polar night came to an end. March was on an average the coldest month, and during the same the station was for a short time snowed up. During April and May fresh weather reigned. Early in June a whaler passed the island, but did not observe the station, and by the end of the month no ice was found on the island. Throughout the winter but little stove firing was necessary, and both houses and the provisions fully answered their purpose. During an exploration of the island a grave was discovered which is believed to be that of one of the shipwrecked Dutch sailors who wintered here in 1633, and died through scurvy. The scientific observations of the expedition are, the members state, very valuable, and have been carried out in accordance with the international programme. There was no case of scurvy among the members or the crew, against which every precaution had been taken by the munificent patron of the expedition, Count Wilczek.

IN September it will be exactly twelve months since the *Dijmphna* and the *Varna* were last seen in the Kara Sea, since when no news whatever as to the fate of the two vessels has been obtained. It was hoped that the *Willem Barents*, which has been cruising in the Kara Sea during the summer, would have brought some tidings of the missing vessels, but this expectation has failed, as recently stated in NATURE, the Dutch exploring vessel neither finding any trace of the same, nor learning anything from the Samoyedes on the coast of Siberia. If the rumour, which was current early in the year, that the Samoyedes had seen the wreck of a large vessel on the *east* coast of Waigatz Island, is remembered, and which was proved to be incorrect, we may assume that there is as little truth in the recent one to the effect that a vessel had wintered off the *east* coast of that island, a spot which it is hardly likely that either vessel could have reached. On the other hand there is little probability of the hope expressed by Hovgaard in his last despatch and by Nordenskjöld having been realised, viz. that the equinoctial gales of October would set the vessels free and enable them to winter at Port Dickson or adjoining port, as Hovgaard had instructions from Herr Gamél, in such an eventuality, to despatch a message thereof to Yakutsk, and if this was done it would have reached us ere now. There is now only the hope left, if no mishap has occurred to the vessels, that they got free early in the spring, as Norwegian smacks found open water in the Waigatz Strait as early as in May last, and have proceeded to Port Dickson, from whence news may now be looked for. This port may have been reached in safety, although it seems remarkable that the Dutch Meteorological Expedition should not have returned to Europe instead during the summer in accordance with the instructions of the Circumpolar Congress, by which all parties were to return in August of the present year. If to this are coupled the circumstances that the *Varna* is merely a third class Norwegian coasting steamer of inferior qualities and the *Dijmphna*, although strengthened for Polar exploration, an old vessel of no great strength, and that the vessels were last seen in a place which is notorious for the terrible pressure and drift of the pack-ice, with sudden hurricanes, there certainly seems ground for the anxiety for the ships which is now becoming manifest in Copenhagen and Amsterdam. The Dutch have, we learn, taken decided steps to ascertain the fate of their countrymen, it having been decided at a meeting in Amsterdam last week immediately to equip and despatch a steamer in search of the *Varna* from Hammerfest, in Norway.

THE *Ellida* left Hammerfest last week to try to discover the missing Dutch Expedition. The Meteorological Institution has now contracted with the owners of a second ship, the *George*, which started on Saturday from Archangel with orders to land on the west coast of Waigatz, and to send help overland to the Kara Sea if the entrances by water are closed. A telegram from Utrecht announces that a Dutch gentleman offers a reward of 50,000 Norwegian krone to the ship which shall find the Dutch Polar Expedition, last seen in the autumn of last year on board the *Varna* in the Kara Sea. This expedition had assigned to it the carrying out of the magnetic and meteorological observations at the mouth of the Yenisei, under the command of M. Lamie, a lieutenant in the Royal Netherlands Navy.

IN the *Bolletino* of the Italian Geographical Society for August, Sig. C. de Amezaga gives a detailed account of the Galapagos Islands, based on the recent reports of MM. Icaza and Wolf. The archipelago, which belongs politically to the Republic of Ecuador, is a sort of No Man's Land, at present almost uninhabited except by cattle, goats, swine, horses, asses, and dogs, placed there early in the present century, which have multiplied exceedingly, and partly reverted to the wild state. The dogs especially are very numerous and savage—like their wolfish ancestors preying on the goats and cattle. Similar propensities have been developed by the "bimana" from the mainland, who, at various dates between 1831 and 1878, have attempted to establish settlements on Floriana (Charles Island) and one or two other members of the group, but who generally ended by mutually exterminating each other. The archipelago comprises thirteen volcanic islands, and numerous rocks scattered over a space of about 6000 square miles, but collectively forming scarcely more than 720 square miles of dry land. Within this limited area are represented two remarkably distinct physical and climatic zones, one low, hot, barren, and rainless, extending from the sea-level to an elevation of about 650 feet, the other thence to an extreme altitude of 1435 feet (cone at north extremity of Albemarle Island), subject to tropical rains from February to May, followed by heavy dews for the rest of the year. Here the igneous rocks have been completely disintegrated, forming a thick layer of argillaceous clay and humus, on which flourishes a varied and vigorous vegetation. But this upland wooded region is of such limited extent compared with the arid lowlands, that probably not more than 60 square miles altogether are suitable for cultivation. The native flora, while in general of the American type, presents many peculiarities, especially in the phanerogamous plants, all of distinct species, which have not been satisfactorily explained by the special climatic and physical conditions. There is also a total absence of lianas, creepers, palms, musaceæ, aroideæ, and the other monocotyledonous families which form the glory of the Amazonian forests. The indigenous fauna is represented chiefly by reptiles, including four or five species of snakes, none of which are venomous. The huge turtles and land tortoises, the strange marine ignanas, and other survivals from remote geological epochs, impart a certain antediluvian aspect to the landscape, especially of the low-lying coastlands, which are little frequented by the animals recently imported from the mainland. The climate, everywhere healthy, with an average temperature not exceeding 73° or 74° F., even in the hot zone, is favourable both for stockbreeding and the cultivation of sugar, bananas, and all kinds of vegetables and fruits of tropical and temperate regions. There, are, however, no mineral resources, and a complete absence of guano, phosphates of lime and carbon, all of which were formerly supposed to abound in the archipelago. On the other hand, there are a few good and easily-accessible havens, such as those of Post Office Bay and Black Beach Roads on the east side of Floriana. Hence the Galapagos Group, lying at about 900 miles from Panama on the direct route to Australasia, cannot fail to acquire great economie importance as a provision and coaling station as soon as the projected interoceanic ship canal is constructed. The notice is accompanied by a good chart of the archipelago on a scale of 1 : 889,000, showing elevations, cones (of which two are still active), marine and prevailing atmospheric currents.

IT may be remembered that Baron Nordenskjöld, at the moment of leaving Iceland on the present expedition, discovered in the possession of an Icelander an old map of North Europe, which he, judging from his announcement of the discovery through the medium of the Royal Geographical Society, believed to be very old, perhaps as old as the famous Zeno map, to which reference has previously been made in NATURE, and which he appeared to consider further supported his views concerning the Norse settlements in Greenland. We have, with reference to the map in question, received a communication from an eminent Swedish geographer, informing us that, having had an opportunity of examining the map now in Stockholm, he is convinced that it is simply a Dutch sea chart from the beginning of the seventeenth century, and of no value whatever, which he believes Baron Nordenskjöld did not, under a mere cursory examination, discover. In consequence of the opinion pronounced by our correspondent, the Swedish Geographical Society has decided not to have facsimiles of the map taken.

INDIAN METEOROLOGY[1]

II.

THE title of Paper IV.—"Storms in Bengal, accompanied by increased Atmospheric Pressure and the Apparent Reversal of the Normal Diurnal Oscillation of the Barometer," by Prof. J. Eliot,—must necessarily appear somewhat strange to those accustomed in our latitudes to the frequent masking, if not actual reversal, of the normal diurnal oscillation, by the large and rapid non-periodic oscillations to which the atmospheric pressure is subject.

There are two reasons why this reversal should be rare in the tropics, and of such frequent occurrence, as to be more often the rule than the exception, in higher latitudes. One is, that the range of the diurnal barometric oscillation is greatest near the equator, and diminishes as we approach the poles, and the other, that the range of the non-periodic oscillations varies in precisely the opposite way, increasing very nearly in the ratio (as Ferrel has shown) of the square of the sine of the latitude to unity.[2]

Instances of such inversion, are said by Prof. Eliot to be extremely rare in Bengal, but a perusal of the paper leads us to conclude that it is rather a case of *de non apparentibus* than *de non existentibus*, and that a tendency towards reversal takes place to some extent in all north-westers and analogous storms of a sudden and violent character.

Humboldt, Col. Sykes, and Allan Broun, have all graphically described the regular march of the diurnal barometric oscillation, but their observations were mostly made a good deal nearer the equator than Bengal, and thus in regions where reversal of the diurnal oscillation would be a still rarer phenomenon.

In the cases cited by Eliot, including one observed by Hill at Allahabad, the following characteristic changes were observed about the time of reversal:—

1. A marked rise of the barometer.
2. An equally marked and simultaneous fall of the thermometer.
3. A sudden decrease of the tension of aqueous vapour.
4. An instantaneous change of wind direction.

A consideration of all these features, leads the author to conclude that in these cases a downrush of cold air belonging to an upper current (which is known to travel seawards in Bengal, and is therefore dry) takes place in the centre of the area of low pressure belonging to the storm. On no other hypothesis, does it seem possible to explain all the facts, especially the rise in the barometer, and the fall in vapour tension.

A close study of these north-westers, whether accompanied by reversals or not, and their analogues in other parts of the world, is certain to unravel much of the complexity surrounding such and all aërial disturbances, and as all facts bearing on them are valuable, and the present writer was for some time resident in a locality (Dacca) where they occur with marked intensity, he may perhaps be allowed to remark that one of the most peculiar features he has noticed in connection with them, is the almost instantaneous return of the wind to its original direction after the rear of the storm-cloud has passed the zenith. Both before and after the storm, the wind in Bengal blows from the direction of the sea (south-east). The storm-cloud appears to form in the north-west by an aggregation of vapour that is carried thither in cloudlets from the sea. After a time, the threatening mass advances towards the sea, the sea-wind meanwhile blowing towards the advancing cloud with increased force, until the latter has arrived pretty close, when a lull takes place, after which the wind instantaneously changes to the opposite quarter (generally through the north), from which it blows with great violence. Then come the characteristics already noticed, together with continuous lightning and hail, the latter often very large.

When the storm-cloud, the rear of which presents a very definite outline, passes the zenith, the wind invariably returns to its former direction, and gradually dies down as night approaches. The whole phenomenon appears to favour the notion which has always been entertained by the writer, and is merely a slight extension of the explanation given by Prof. Eliot, that a sudden *oblique* uprise of moist hot air takes place, deflecting the upper current into a corresponding *oblique* downward course, which determines the direction of the storm and continues as long as the uprising air interferes with its regular motion parallel to the surface. This explains why the storm always follows the course of the upper current, as well as the immediate readjustment of the original conditions, as soon as the region of ascending air which causes the deflection has passed the spot.

Paper V. "On the Rainfall of Benares in Relation to the Prevailing Winds," by S. A. Hill.—The observations utilised in this paper, as far as the velocity of the wind is concerned, raise a question of general importance, and one which we think ought to engage the attention of all thoughtful, and certainly all practical meteorologists. Up to 1872, the anemometer was only 15 feet above the ground, but in that year it was raised to a height of nearly 80 feet. Now what are we to think of the effect of such a change of position on the observations?

According to Mr. Stevenson, 15 feet is the lowest elevation at which an anemometer should be placed, since below this height the velocity is found to be enormously affected by the nature of the surface. On the other hand, 80 feet is an elevation which would not only cause the instrument to register a considerably higher velocity,[1] but also secure for it nearly complete immunity from the disturbing influences which would be sure to affect it in the lower position.

It is indeed very much to be regretted that in setting up anemometers in India no sort of uniformity seems to have been attempted. Thus from a list of their elevations above the ground given in the "Meteorological Report for India" in 1876, every variety of height imaginable occurs, ranging from 5 feet 7 inches at Khandwa to 76 feet 11 inches at Benares! At no two stations are the anemometers at the same level, and though it is somewhat complacently admitted by Mr. Blanford "that it can hardly be affirmed that in the majority of cases the anemometric records are strictly comparable," one is naturally inclined to ask why the instruments could not have been placed, if not exactly, at least more nearly, at the same level. Such an arrangement would seem to be a cardinal requisite where such a sensitive element as air motion is involved, and indeed Mr. Stevenson's experiments have shown that while observations below 15 feet are almost useless, the velocity increases rapidly with the height through the first 100 feet; so that until a correction is made for the height, it would be vain to attempt a comparison of observations made at lower, with those at higher levels.

Fortunately in this case the discussion mainly relates to the direction of the wind, so that the conclusions are not seriously affected by the change in the position of the instrument.

The chief conclusion arrived at by the author is similar to that obtained by Mr. Blanford in the first paper of this series for Calcutta, except that Benares affords no corroboration of the conclusion drawn from the former register, that "rain is the more probable in proportion as the deflection of the monsoon current is greater."

It appears, nevertheless, that there is a well-marked connection between the amount of rain that falls *in a day* and the deflection of the rain-bearing current, the maximum amount being from the opposite quarter (north-west) to that from which the monsoon blows.

Paper VII. "Variations of Rainfall in Northern India," by S. A. Hill.—This is one of the most interesting and important papers of the whole series, its ostensible object being partly to test the soundness of the idea which was propounded by Dr. W. W. Hunter and others in 1877, that sunspots, rainfall, and the occurrence of droughts and famines were closely associated in India. Regarding this *vexata quæstio* it may be said at the outset that while the general results of an investigation embracing an area which covers eleven degrees of latitude and twenty of longitude (equal to that of the British Isles, France, Germany, Austria, Holland, and Belgium combined), like those of Mr. Blanford for Southern India, bear out Meldrum's theory of an eleven-year cycle of rainfall, they exhibit certain irregularities, or, more properly speaking, double oscillations, which, as Prof.

---

[1] Concluded from p. 407.

[2] "Relation between the Barometric Gradient and the Velocity of the Wind," by W. Ferrel. *American Journal of Science*, vol. viii., November, 1874.

[1] According to Mr. Stevenson's formula, which holds near the surface, the velocity would be increased by this change of position in the ratio 1·32 : 1. Thus for 1872 the observed mean value was 67·8. To make this comparable with the years that follow, it should be 89·4!